

GOVERNMENT POLYTECHNIC, PUNE
(An Autonomous Institute of Govt. of Maharashtra)

Programme	:	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	:	01/02/03/04/05/06/07/08/16/17/21/22/23/24/26
Name of Course	:	Digital Communication
Course Code	:	ET485

Teaching Scheme:

	Hours /Week	Total Hours
Theory	03	48
Practical	02	32

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests, each of 60 minutes	3 Hrs.	3 Hrs.	--	--
Marks	20	80	50	--	--

Course Rationale:

Knowledge of Data communication is of prime importance, now a days. Digital communication has flexibility in Data Transmission. This is a core technology subject which will enable student to comprehend facts, concepts & working principle of digital communication system. This subject familiarizes the student with information theory, measurement of information rate & capacity. This subject helps the student to understand the concept of various pulse modulations, Digital modulation techniques, coding methods and error control, multiplexing & multiple access techniques and S.S. modulation. The knowledge acquired by students will help them to apply it in various modern communication systems.

Course Objectives:

After studying this course, the student will be able to

- To Compare analog communication system & digital communication system.
- To Understand sampling theorem.
- To Understand & Compare PAM, PWM, PCM.
- To Study the block diagram of PCM, DM, ADM, and DPCM.
- To Study block of PSK transmitter & receiver. Compare ASK, FSK, PSK.
- To Study block diagram for QFSK, QAM DP
- To Study various types of coding methods, error detection and correction.
- To Study concept of TDMA, FDMA, and CDMA.
- Define PN sequence.
- Explain spread spectrum modulation.
- Compare Direct sequence & & frequency spread spectrum signal.

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Course Content:

Chapter .No.	Name of Topic/Sub topic	Hrs	Marks
SECTION – I			
1.	Introduction of Digital Communication		
	Basic digital communication system, block diagram, Channel capacity-definition, Hartley's law, Shannon-Hartley theorem, Channel capacity equation, channel noise and its effect, entropy, Advantages and disadvantages of digital communication.	04	08
2.	Pulse Communication		
	Introduction, comparison with Continuous Wave Modulation, Advantages, Sampling theorem, Nyquist rate, aliasing, natural & flat top sampling, PAM, PWM, PPM definition, generation, block diagram, waveform analysis, and their comparison, Pulse code modulation- block diagram of PCM transmitter & receiver, sampling quantization, quantization error, companding, inter symbol interference, Delta modulation- block diagram of DM, slope overload, granular noise, ADM, DPCM, block diagram and its working.	13	16
3.	Digital Modulation Techniques		
	ASK, FSK, PSK definition & waveforms, their transmitter and receiver block diagram and working, M-Ary encoding, QPSK, QAM, DPSK block diagram of transmitter and receiver and working, Bandwidth for each modulation technique and their comparison.	13	16
SECTION – II			
4.	Coding Methods and Error Control		
	Baud rate, Bit rate, Line coding – unipolar, bipolar – NRZ, RZ, Manchester, Source coding, ASCII, EBCDIC and baudot code, Channel coding, Error, Causes of error and its effects, error detection & correction using parity, Hamming code & simple numerical.	06	12
5.	Multiplexing and Multiple Access		
	Need of Multiplexing, TDM, FDM definition block diagram and their comparison, Introduction to WDM. Access technique TDMA, FDMA, CDMA (only concepts), advantages of TDMA over FDMA.	06	12
6.	Spread Spectrum Modulation (Only Descriptive Treatment)		
	Introduction, PN Sequence, Model of spread spectrum modulation system, Direct sequence spread spectrum signal, Frequency hop spread spectrum, slow frequency hopping, and fast frequency hopping, Application S. S. modulations.	06	16
	TOTAL	48	80

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List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Observe waveforms of Pulse Amplitude modulation (using natural sampling & flat top sampling).
2.	Observe waveforms of Pulse Position modulation (using natural sampling).
3.	Observe waveforms of Pulse code modulation and demodulation.
4.	Observe waveforms of Delta modulation.
5.	Observe waveforms of Adaptive delta Modulation.
6.	Observe waveforms of ASK modulation & demodulation.
7.	Observe waveforms of FSK modulation & demodulation.
8.	Observe waveforms of PSK modulation & demodulation.
9.	Observe waveforms of QPSK modulation & demodulation.
10.	Observe waveforms of QAM modulation & demodulation.
11.	Error detection & correction using parity bits.
12.	Time division multiplexing/ de multiplexing system.
13.	Frequency division multiplexing/ de multiplexing system.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Introduction of Digital Communication	Classroom Teaching.
2.	Pulse Communication	Classroom Teaching & Laboratory Work.
3.	Digital Modulation Techniques	Classroom Teaching & Laboratory Work.
4.	Coding methods and Error control	Classroom Teaching & Laboratory Work.
5.	Multiplexing and Multiple Access	Classroom Teaching & Laboratory Work.
6.	Spread spectrum modulation (Only Descriptive treatment)	Classroom Teaching.

Text Books:

Sr. No	Title	Author	Publication
1.	Digital Communication	Siman Haykin	John wiley & sons
2.	Communication System	Roddy Collen	Prentice Hall of India
3.	Digital Communication	Amitabha Bhattacharya	Tata McGraw Hill

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Reference Books:




Sr. No	Author	Title	Publication
1.	Roddy coolen	Electronics Communication	PHI

Learning Resources : Reference Manuals, Text Books, Reference Books, O.H.P. Transparencies, L.C.D. Projector, Computer aided Instructional packages, Simulation of signals using simulation soft-wares, Reference Books, Manuals and Journals of Devices, Components Brochures, Notes, Website.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Introduction of Digital Communication	4	2	2	08
2.	Pulse Communication	6	4	6	16
3.	Digital Modulation Techniques	6	4	6	16
4.	Coding methods and Error control	8	2	2	12
5.	Multiplexing and Multiple Access	6	3	3	12
6.	Spread spectrum modulation (Only Descriptive treatment)	8	4	4	16
Total		38	19	16	80

Prepared By :

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